

California High-Speed Train System



TECHNICAL MEMORANDUM

Construction Specifications Preparation for Design-Build Contracts TM 1.1.24

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Revision	Date	Description
0	21 Mar 13	Initial Release, R0

Note: Signatures apply for the latest technical memorandum revision as noted above.

System Level Technical and Integration Reviews

The purpose of the review is to ensure:

- Technical consistency and appropriateness
- Check for integration issues and conflicts

System level reviews are required for all technical memoranda. Technical Leads for each subsystem are responsible for completing the reviews in a timely manner and identifying appropriate senior staff to perform the review. Exemption to the system level technical and integration review by any subsystem must be approved by the Engineering Manager.

System Level Technical Reviews by Subsystem:

Systems:	<u>Signed document on file</u> Brad Banks, PE	<u>18 Mar 13</u> Date
Infrastructure:	<u>Signed document on file</u> John Chirco, PE	<u>22 Feb 13</u> Date
Operations & Maintenance:	<u>Not required</u> Joe Metzler	<u> </u> Date
Rolling Stock:	<u>Not required</u> Frank Banko	<u> </u> Date
Project Management Oversight:	<u>Signed document on file</u> Michael D. Lewis, PE	<u>12 Mar 13</u> Date

Note: Signatures apply for the technical memorandum revision corresponding to revision number in header and as noted on cover.



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ABSTRACT

The purpose of these instructions is to promote consistency in the Construction Specifications and as-built Construction Specifications throughout the California High-Speed Train System (CHSTS). Toward this goal of consistency, the following subjects are addressed:

- Role of the Construction Specifications
- Components
- Contractor's responsibility for specifications
- How CHSTS Standard Specifications are invoked (incorporated by reference)
- Organization and content
- Terminology and conventions
- Formatting



1.0 GENERAL

1.1 PURPOSE

The purpose of these instructions is to promote consistency in the Construction Specifications and as-built Construction Specifications throughout the California High-Speed Train System (CHSTS).

The requirements spelled out herein apply to the preparation of Construction Specifications and as-built Construction Specifications by the design-build Contractor's team.

2.0 CONSTRUCTION SPECIFICATIONS

2.1 ROLE OF THE CONSTRUCTION SPECIFICATIONS

Construction Specifications for CHSTS contracts shall define the requirements for products, materials, installation, construction, and workmanship upon which the construction shall be based. The Construction Specifications shall also, as appropriate within the framework of the specific CHSTS contract, define details for administration and performance of the project.¹

- In conjunction with the Construction Drawings and other documentation such as reports, Construction Specifications shall communicate and document what the Contractor will build and how as well as requirements for other construction-related activities and their documentation.
- Construction Specifications shall define how the work shall be performed and controlled, such as quality assurance and control, and construction phase submittals in a manner similar to the Standard Specifications for use by the Contractor and those monitoring, overseeing, or approving construction. The quality control requirements spelled out in the Construction Specifications shall be one of the bases of and be coordinated with the Contractor's Quality Management System.
- Construction Specifications shall be maintained during construction and become part of the "as-built" record delivered to the Authority for its use in maintenance of the Work and for future design and construction.

2.2 COMPONENTS OF CONSTRUCTION SPECIFICATIONS

Incorporate the following components at the beginning of the Construction Specifications.

- **Cover page:** Furnish a cover page with each submittal of the Construction Specifications including the information shown in Exhibit A, at minimum.
- **Seal Pages:** Furnish seal pages listing the Construction Specifications Sections with the corresponding engineer, architect, or landscape architect. Furnish seal pages with seals and signatures for final submittals. See Exhibit C.
 - There may be instances when an engineer or other professional is responsible for only part of the work of their discipline. In those cases, the list of Sections may be qualified with phrases such as "(in regard to work between Station 10+100.00 and Station 20+000.00 only)" or "(in regard to street lighting only)".
- **Preface Page:** The preface page for the Construction Specifications is included as Exhibit B. In addition to the title identification of "Construction Specifications", this page contains three explanatory paragraphs dealing with invoking and modifying of the Standard Specifications.

¹ Paragraph based on text of the Project Resource Manual (CSI Manual of Practice), Fifth Edition, Copyright © 2005 by the Construction Specifications Institute.



- **Table of Contents:** Furnish a Table of Contents for the Construction Specifications containing Division and Section numbers and titles along with the numbers and titles of attachments and appendices included in the Construction Specifications. Format the Table of Contents as shown in Exhibit D.

The body of the Construction Specifications is made up of individual sections, and shall be contract-specific and complete. Construction Specifications sections include the following:

- Specifications prepared by the Contractor
- Standard Specifications invoked and incorporated by reference
- Standard Specifications invoked and incorporated by reference and modified or augmented by the Contractor

2.3 RESPONSIBILITY FOR CONSTRUCTION SPECIFICATIONS

Contractor shall review the Standard Specifications and determine applicability of each provision (mandatory and reference) of the Standard Specifications to Contractor's final design and construction methods and determine what additional specifications are required. The Contractor in drafting the Construction Specifications shall have thoroughly reviewed the Standard Specifications and made whatever changes are necessary to suit the specifications to its design. Review shall include review of reference standards.

The Standard Specifications, including mandatory requirements, represent minimum requirements and general requirements. The registered individuals who prepared the Construction Specifications, in signing and sealing the Construction Specifications, shall be responsible for the Construction Specifications suitability to the design and construction and compliance to the Design Criteria and other Contract provisions. These signatures and seals and determination of suitability shall encompass the Standard Specifications provisions invoked and made applicable through the Construction Specifications.

2.4 INVOKING THE STANDARD SPECIFICATIONS

The applicable sections of the Standard Specifications shall be individually invoked and made applicable in the Construction Specifications.

Most of the Standard Specifications Sections contain requirements to be supported by information supplied elsewhere (either in the Construction Specifications or on the Construction Drawings). This information consists of requirements unique to a particular contract such as concrete class (strength) and the type of material and equipment to be incorporated into the Work.

- **Introductory Paragraph for Construction Specifications Sections:** Invocation of the CHSTS Standard Specifications shall be accomplished as follows:
 - If a Standard Specifications Section is incorporated into the Construction Specifications without changes, there shall be an introductory (or preface) paragraph, located directly under the section title, which invokes the corresponding section of the Standard Specifications. Refer to Exhibit E. This paragraph shall read as follows:

The provisions of CHSTS Standard Specifications Section (number),
(Section Title), shall apply to the Work.

- When the Construction Specifications modify a Standard Specifications Section as illustrated in Exhibit F, then this introductory paragraph shall read as follows:

The provisions of CHSTS Standard Specifications Section (number),
(Section Title), shall apply to the Work as modified herein.



- When a Standard Specifications Section exists, but the Construction Specifications require that a Standard Specifications Section be superseded, the introductory paragraph shall read as follows as illustrated in Exhibit G:

The provisions of CHSTS Standard Specifications Section (number), (Section Title), shall be superseded by the Construction Specifications herein.

- **Numbering Construction Specifications Articles:** When modifying or augmenting a Standard Specifications Section in the Construction Specifications, maintain coordination between the Standard Specifications and the Construction Specifications by using identical numbers for modifications to existing Standard Specifications Articles. Number a modification to Article 2.3D. in the Standard Specifications as Article 2.3D. in the Construction Specifications. When a new requirement is to be added, use the next available number. If the last Article number in the Standard Specifications Section's Part 2 for example, is Article 2.3, number a new Article 2.4. In the case of a new Paragraph-level requirement, assuming the last Paragraph in the Standards is 2.3D, number the new Paragraph 2.3E. (See Exhibit B for explanation of numbering of Construction Specifications Articles.)

2.5 MODIFYING STANDARD SPECIFICATIONS SECTIONS

- Modifications to the Standard Specifications shall be made in accordance with the following rules:
 - Modifications of the Standard Specifications shall include only those modifications which are necessary to convey requirements, products, and installation standards which are special to the specific contract.
 - Modification of the Standard Specifications shall be accomplished with additions, revisions, or deletions and substitutions as indicated in Exhibits F and G. When configuring additions, revisions, deletions, and substitutions, consider the clarity of the resulting Construction Specifications. For example, if a section requires many changes, it may be better to supersede the Section with an entire revised Section. Contractor's submittals of the Construction Specifications, when including a revised Standard Specifications, shall include a tracked changes version for the reviewer's information.
 - In preparing a Construction Specifications Section which invokes a Standard Specifications Section, it is neither necessary nor desirable to delete all inapplicable Articles or Paragraphs in the corresponding Standard Specifications Section. For example, Standard Specifications Section 31 35 00, Slope Protection, provides for several different kinds of slope protection. If slope protection by hydroseeding is the only classification of slope protection to be provided for a particular contract, then delete the Paragraphs that list the different types of slope protection under Article 1.1 and add a Paragraph 1.1A "Hydroseeding". No further deletions of inapplicable provisions from Standard Specifications Section 31 35 00, Slope Protection, are necessary. Refer to Exhibit F.
- Additions: Modifications to the Standard Specifications may be new requirements and will appear as new Articles or Paragraphs. Make additions as shown in the following examples:

1.2 REFERENCE STANDARDS: Add the following requirements:
(Number/Title of new Reference Standards)



2.1 MATERIALS FOR PAVING: Add the following sentence at the end of Paragraph 2.1A.
(Insert new sentence)

- Revisions: Additions and deletions may be accomplished by revising an existing Article or Paragraph, or even by revising a single sentence. In such instances, make the revisions as shown in the following examples:

3.3 FIELD PAINTING: Delete Paragraphs 3.3A, B, and D, and substitute the following:

A. (Insert replacement)

B. (Insert replacement)

D. (Insert replacement)

3.3 FIELD QUALITY CONTROL: Delete the specified requirements and substitute the following:
(Insert replacement)

2.2 FABRICATION: Delete the second sentence of Paragraph 2.2A. and substitute the following:
(Insert replacement sentence or sentences)

- Deletions: In some cases it may not be made clear which provisions of the Standard Specifications are applicable in other Contract Documents or through modification of Article 1.1, Section Includes. In such cases, deletions without replacement provisions are required. Make deletions as shown in the following two examples. In the first example, note, there is no Paragraph 2.2G. If there were a Paragraph 2.2G, replacement of 2.2F. with "F. Not used." would be necessary:

2.2 CONTRACTOR-FURNISHED MATERIALS: Delete Paragraph 2.2F. in its entirety.

1.3 SUBMITTALS: Delete Paragraph 1.3D.1. and substitute the following:

1. Not used.

- References to the Construction Specifications in the Standard Specifications: When a Standard Specifications Section refers to a Construction Specifications Section, this reference indicates that typically a contract-specific provision in the Construction Specifications Section with the same number and name as the Standard Specifications Section is required.

2.6 NEW SECTIONS

The Standard Specifications do not cover all conditions required for each project. New sections will be required to augment the Standard Specifications for classifications of work not covered therein. Contractor shall develop these new sections following the guidance presented in the remainder of these instructions. Also refer to the Standard Specifications and the illustration of the first page of a new "Construction Specifications" section illustrated in Exhibit H including the word "NEW" in bold capital letters in the top margin.



- Select a six-digit number and a title for each new section. Number and title shall be selected in accordance with MasterFormat,² current edition. Coordinate with numbers and titles already designated in the Standard Specifications.
- Eliminate nonessential language and state exactly what is required to avoid the possibility of more than one interpretation being given to a requirement.

3.0 SECTION ORGANIZATION AND CONTENT

3.1 CONSTRUCTION SPECIFICATIONS INSTITUTE (CSI) SECTION FORMAT³

Each Section has three Parts:

- PART 1 – GENERAL: Describes administrative and procedural requirements unique to the Section.
- PART 2 – PRODUCTS: Describes systems, assemblies, equipment, products, materials, fabrications, and mixes.
- PART 3 – EXECUTION: Describes site installation or application, including preparatory actions and post-installation cleaning and protection. Site-built or site-manufactured assemblies are included.

When a Section does not require the use of a Part, include number and title of unused Part, followed by the words "Not Used". Within Parts, there are Articles and Paragraphs. An Article must have at least one paragraph. See Figure A for an illustration of Part, Article, and Paragraphs nomenclature:

Figure A – Part, Article, and Paragraph

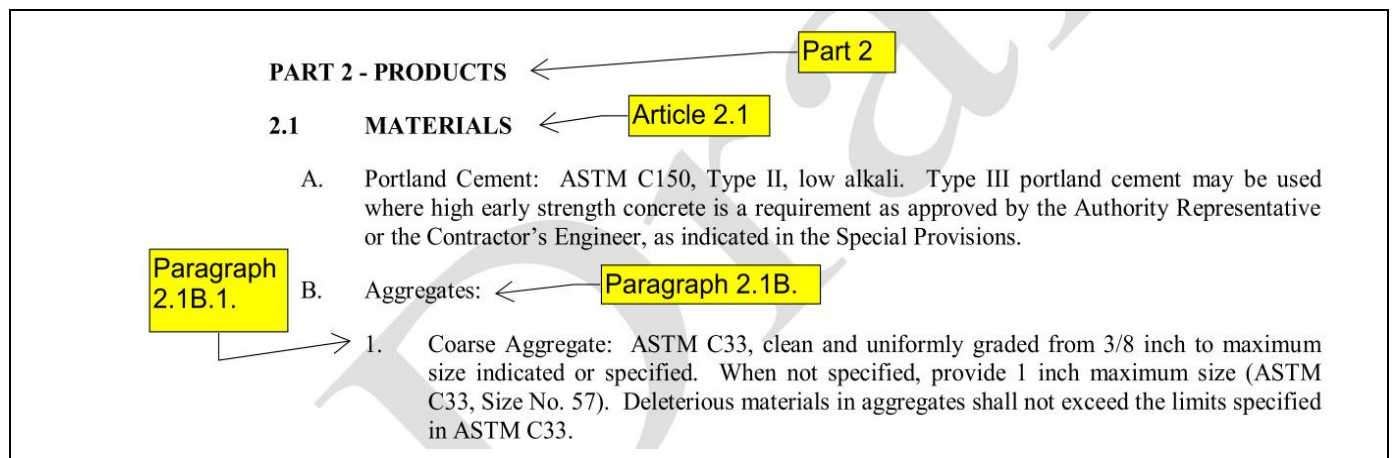


Figure B is CSI's SectionFormat. SectionFormat contains lists of topics, in order, for use in Sections. Note the following in regard to the lists:

- Highlighted titles are typically included in many Sections.
- Article "SECTION INCLUDES" is included in all Sections.

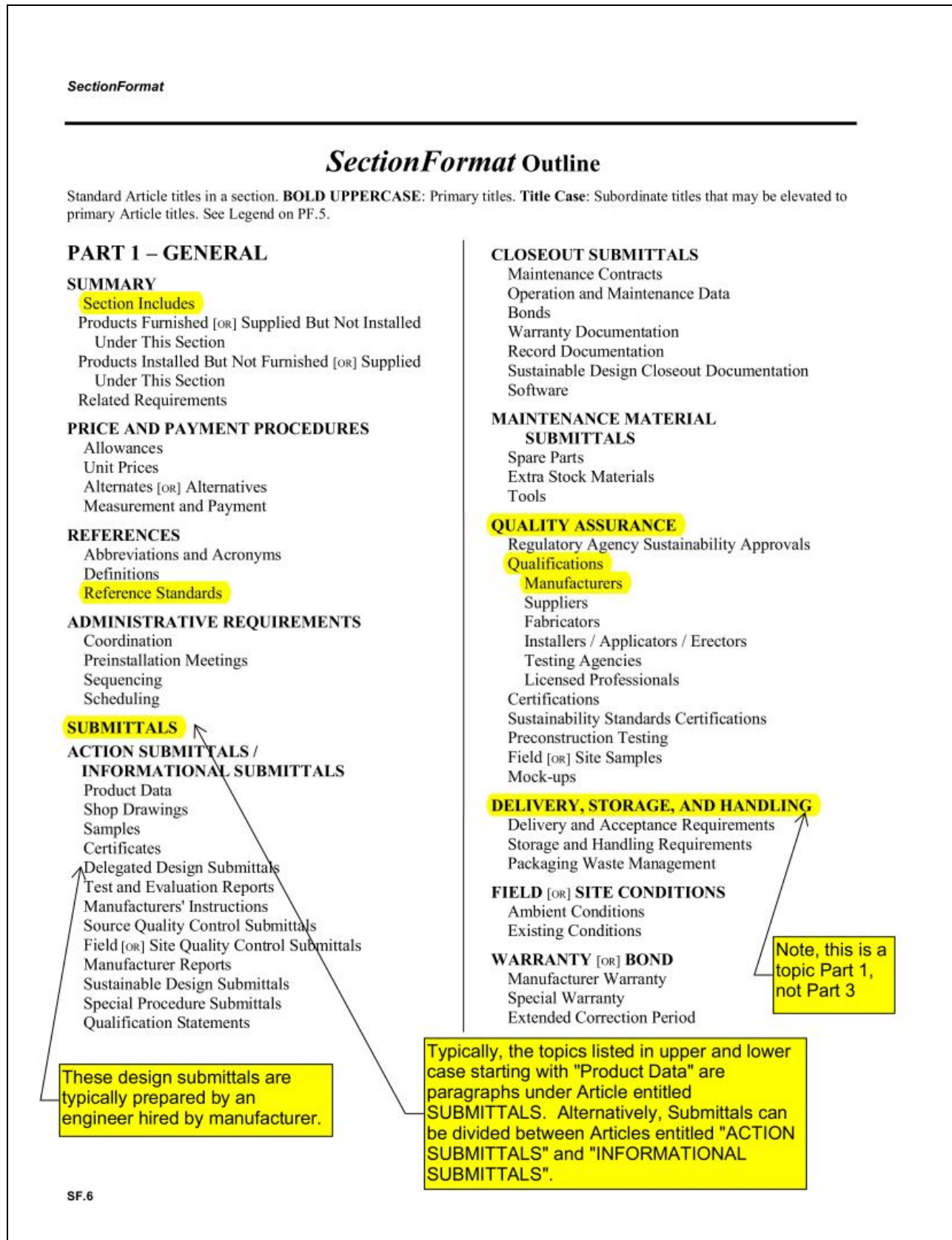
² MasterFormat is a master list of numbers and titles for organizing information within construction contracts and related documents and filing systems. Copyright by and available from the Construction Specifications Institute.

³ SectionFormat / PageFormat, Recommended Format for Construction Specifications Sections, Copyright © 2008 by the Construction Specifications Institute.



- When a title which is listed in all capital letters in Figure B is included in a Section, it typically should be an Article title and not a Paragraph title.
- The titles in upper and lower case can either be paragraph titles or subjects and can be “elevated” to an Article title.
- Develop other titles as needed and locate them within a Section where they would logically fit within CSI SectionFormat.



Figure B – SectionFormat

SectionFormat

PART 2 – PRODUCTS**OWNER-FURNISHED [OR] OWNER-SUPPLIED PRODUCTS**

New Products
Existing Products

[SYSTEMS] / [ASSEMBLIES] /
[MANUFACTURED UNITS] / [EQUIPMENT] /
[COMPONENTS] / [PRODUCT TYPES] /
[MATERIALS] / [USER-DEFINED HEADING]

Manufacturers

Manufacturer List
Substitution Limitations
Product Options

Description

Regulatory Requirements
Sustainability Characteristics

Performance / Design Criteria

Capacities

Operation

Operators
Controls
Operation Sequences

Materials**Assembly [OR] Fabrication**

Factory Assembly
Shop Fabrication
Assembly [OR] Fabrication Tolerances

Mixes**Finishes**

Primer Materials
Finish Materials
Shop Finishing Methods

ACCESSORIES**SOURCE QUALITY CONTROL**

Tests and Inspections
Non-Conforming Work
Manufacturer Services
Coordination of Other Tests and Inspections

Depending on the nature of the product specified, pick one of these titles.

PART 3 – EXECUTION**INSTALLERS**

Installer List
Substitution Limitations

EXAMINATION

Verification of Conditions
Preinstallation Testing
Evaluation and Assessment

PREPARATION

Protection of In-Place Conditions
Surface Preparation
Demolition / Removal

ERECTION / INSTALLATION / APPLICATION / [USER-DEFINED PROCESS]

Special Techniques
Interface with Other Work
Systems Integration
Tolerances

[REPAIR] / [RESTORATION]**RE-INSTALLATION****FIELD [OR] SITE QUALITY CONTROL**

Field [OR] Site Tests and Inspections
Non-Conforming Work
Manufacturer Services

SYSTEM STARTUP**ADJUSTING****CLEANING**

Waste Management

CLOSEOUT ACTIVITIES

Demonstration
Training

PROTECTION**MAINTENANCE****ATTACHMENTS****END OF SECTION**

Schedules
Tables
Illustrations
Forms

A table may be included in Parts 1 through 3 or after "END OF SECTION"

Depending on the nature of the work specified in a particular section, pick one of these titles.

END OF SECTION is not an Article title. Note that schedules and illustrations can be attached after "END OF SECTION"

SF.7



3.2 INITIAL ARTICLES

SECTION INCLUDES: It is recommended that Article 1.1 always be entitled: **SECTION INCLUDES**. List significant generic types of products, work results, or requirements specified. Be brief and do not include “providing all the necessary labor, materials, tools, equipment and incidentals necessary for _____ as shown on the Design Drawings and as specified herein”. It is typically not necessary to list procedures, prep work, secondary products, or final adjusting under “SECTION INCLUDES”. See Figure C.

Figure C – Article entitled SECTION INCLUDES

SECTION 03 05 15	
PORTLAND CEMENT CONCRETE	
PART 1 - GENERAL	
1.1	SECTION INCLUDES
A.	Portland cement.
B.	Aggregates.
C.	Drying shrinkage of concrete.
D.	Concrete admixtures and cementitious materials.
E.	Tests and analysis of materials.
F.	Mix designs.
G.	Batching, mixing, and transporting.

RELATED REQUIREMENTS: Use Part 1 Article entitled “RELATED REQUIREMENTS” sparingly. This Article lists such things as related Sections. If such an Article seems necessary, briefly list other documents or Sections. Limit list to documents or Sections with specific information that the reader might expect to find in this Section but is specified elsewhere. If another Section is referenced somewhere in the text of the Section, it does not have to be repeated here. Cross-referencing here may also be used to coordinate assemblies or systems among multiple Sections.

REFERENCE STANDARDS: An example of Part 1 Article entitled “REFERENCE STANDARDS” is illustrated below. List every referenced standard, i.e., ASTM E84, referenced within the Section with the correct name of its issuing organization and the complete name of the standard. Generally the date of the standard is not stated. For example, ASTM A36 is listed instead of ASTM A36-09. When the edition of a code or standard isn’t stated, the edition shall be understood to mean the edition defined in the General Provisions or Section 02 01 00, Standard Specifications General Statements, whichever is applicable. At the Contractor’s discretion, the date may be listed as long as the edition complies with the definitions cited, is more recent, or spells out a code required edition of reference standard.

- Occasionally, a Section requires a list of reference standards which are not referred to in the text. In that case, introduce the list with a paragraph similar to “The work of this Section shall be in accordance with the following standards.”
- When listing an association such as “ASTM International”, also cite specific standards. A reference to an association alone is too broad and does not add anything enforceable to the technical specifications.



1.____ REFERENCE STANDARDS**A. American Concrete Institute (ACI):**

1. ACI 116R Cement and Concrete Terminology
2. ACI 117 Specification for Tolerances for Concrete Construction and Materials

B. ASTM International (ASTM):

1. ASTM C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field

SUBMITTALS: Part 1 Article entitled "SUBMITTALS".

- Specify submittals, when necessary as "for approval by the Contractor's engineer". When necessary, specify a submittal as "for acceptance by the Contracting Officer". See Section 02 01 00, Standard Specifications General Statements for definition of Contractor's engineer and "acceptance".
- Make sure that all submittals are included under the Submittal Article.



3.3 METHODS OF SPECIFYING

There are four methods of specifying: descriptive, performance, reference standard, and proprietary.⁴ The four methods have varying degrees of applicability to the Construction Specifications.

- **Descriptive:** A descriptive specification specifies properties of materials and methods of installation. A descriptive specification is a detailed description of the characteristics, physical properties, and workmanship required for the installation of a product or material.
- **Performance:** Not applicable to Construction Specifications. (A performance specification is defined as a statement of required results for a product or system with criteria for verifying compliance, but without unnecessary limitations on the methods for achieving the required results.)
- **Reference standard:** Specifies product or processes by established standards. Specifications based on reference standards use recognized industry standards rather than individually written product or installation criteria. Carefully review standards to avoid duplications and contradictions, to understand optional requirements, and to be able to properly incorporate the standard into the specifications. Also, verify what edition of the standard will be applicable, and clarify as necessary. Refer to Section 02 01 00, Standard Specifications General Statements, for an explanation of the applicable edition in the Standard Specifications. Note that specific editions may be required under building codes or by a jurisdictional authority. The Contractor may also propose use of a different edition. When a reference standard does not specify all desired characteristics, list the additional requirements.
- **Proprietary:** Proprietary specifications describe products and materials by manufacturer's name, brand name, model number, or unique characteristic. Thoroughly identify each brand or trade name with the name of the manufacturer, model number, model name, type, size, finish, and other classifications that are applicable.

Designated Matching Products: The Authority may establish certain products as Designated Matching Products (DMP). Such selections and designations have not yet been established.

3.4 LANGUAGE AND USAGE

Several of the examples used in the following instructions were adapted from the CSI Project Resource Manual.⁵ The Construction Specifications consist of specifications, therefore the requirements below for "specifications" shall be understood to mean the Construction Specifications.

- Follow the four principles of effective communications: Clear, concise, correct, and complete.
- The specifications are addressed to the Contractor. Generally, omit the words "the Contractor shall". "The Contractor shall" may be used for clarity when both parties to the contract are mentioned in the same article or paragraph. Examples of preferred and acceptable sentences include:
 - Preferred: Perform tests to determine strength and to establish quality.⁶

⁴ Project Resource Manual (CSI Manual of Practice), Fifth Edition, Copyright © 2005 by the Construction Specifications Institute.

⁵ Project Resource Manual (CSI Manual of Practice), Fifth Edition, Copyright © 2005 by the Construction Specifications Institute.

⁶ Called the "imperative mood".



- Acceptable: Contractor shall perform tests to determine strength and to establish quality.
 - Avoid: Tests shall be performed to determine strength and to establish quality.
- Streamlining⁷: Reduce verbiage in specifications if the meaning can be made clear. Use streamlining to list products, materials, reference standards, and other itemized specifications. This technique places the subject first and provides keywords for quick reference. Examples:
 - Equipment: Install plumb and level.
 - Aggregate: ASTM C 33.
- Use words such as “a”, “an”, “the”, and “all” only when needed for clarity.
- Shall/Will/May:
 - Shall: Indicates action that is mandatory on the part of the Contractor.
 - Will: Use “will” to indicate action that will be undertaken by Authority or the Authority Representative.
 - May: Indicates permissible action. Typically, use only for acts that the Contractor may or may not perform, at the Contractor’s option, without concurrence of the Authority Representative. However, where the Contractor’s option consists of the selection from two or more specified materials or methods, specify “use x or y” without the word “may”.
- Specifications: Refer to “these specifications” in lieu of “this specification”. Similarly, refer to “these Construction Specifications” in lieu of “this Construction Specification”.
- Do not address individual manufacturer or installers. For example, say “Provide manufacturer inspection and approval of installation.” Do not write, “Manufacturer shall inspect and approve installation.”
- Do not use “and/or”. It has no definite meaning and is subject to misinterpretation.
- Do not use indefinite words such as “good workmanship”, “adequate”, “reasonable”, “satisfactory”, “generally”, “workmanlike”, “best commercial quality”, and “standard practice”. Use more exact words and, when possible, specify a standard.
- Avoid writing “as approved”, “subject to approval”, and “as required” without making clear who will be required to approve.
- The phrase “in accordance with these Construction Specifications” is generally not necessary; all work must be in accordance with the specifications.
- Quality of work should be “in accordance with” and materials should “conform to” or “comply with” referenced standards or specifications.
- The statement “furnishing all labor, materials, tools, equipment, transportation, facilities, services, and incidentals, and for performing all work necessary for completing ____” is generally not necessary.

4.0 TERMINOLOGY AND CONVENTIONS

4.1 TERMS

Use the terms such as “Contractor”, “Authority”, “Construction Drawings”, “Construction Specifications”, and “jurisdictional authority” consistently throughout the Construction Specifications.

⁷ Refer to Section 02 01 00, Standard Specifications General Statements, for explanation of the streamlined form.



- **Contractor:** The word Contractor shall be used to indicate the “Design-Builder”.
 - Refer to the Contractor throughout the Contract Documents by singular number and neutral gender.
 - The word “contractor” when referring to contractors other than the entity which is contracted with the Authority and to which these specifications are directed, is not capitalized. “Other contractors” are those who are executing separate contracts with the Authority or jurisdictional authorities.
- **Authority:** California High-Speed Rail Authority. The Authority is the owner of the California High-Speed Train System. Do not use the abbreviation CHSRA.
- **Contracting Officer:** The term used for the representative of the Authority in the Standard and Construction Specifications. In the General Provisions and elsewhere, the term for Contracting Officer is Authority Representative.
- **Jurisdictional Authority or Authorities:** Do not use “authority having jurisdiction”. When possible, refer to the jurisdictional authorities by name.
- **Others:** Refer to “others” only when referring to work to be performed by contractors or agencies not a party to the particular contract. Wherever possible, identify the “others”. Do not use “others” to refer to other trades working under the Contract.
- **Additional Terms:** Refer to Standard Specifications Section 02 01 00, Standard Specifications General Statements, for definition of additional terms to be used in the Construction Specifications.

4.2 CAPITALIZATION

Use standard capitalization for the first word of a sentence; proper nouns; entities and agencies; titles; names and trademarks; and names of days, months, and holidays.

Capitalize abbreviations for agencies and entities.

Capitalize names and titles of Sections, Articles, and Appendices.

Use all capital letters for sign or tag names (ON, OFF, AIR, for example). Do not use all capital letters for emphasis.

4.3 SPELLING

Use standard spelling. Do not use shortcut spelling. For example, do not use “thru” for “through”.

4.4 ABBREVIATIONS

Abbreviations may be used if they are clearly defined. Refer to TM 0.0a - Design Terms, Abbreviations, and Acronyms for list of abbreviations.

Identify abbreviations either at the beginning of that section under an Article entitled “Definitions” or at the first in-text mention in the section where they are used. If an abbreviation is to be used only once or twice, or at widely spaced intervals, spell it out instead of using an abbreviation.

Do not use “et cetera” or “etc.” This term conveys no meaning and has no precise definition in specifications. Where an indefinite listing is required, state “...including such items as nuts, bolts, and washers” rather than “...nuts, bolts, etc.”

Avoid the use of abbreviations that eliminate only a few characters. Therefore use “foot” or “feet” and “inch” or “inches” in lieu of “in.” and “ft.”



4.5 NUMBERS

Spell out numbers one through nine. Express numbers 10 and above in figures.

Do not write out both numbers and figures. For example do not write out “two hundred (200)” or “nine (9)”; simply write “200” and “nine”.

Do not use keyboard characters for fractions. The character $\frac{1}{4}$, for example, is illegible on a bad copy and there is no way to make it consistent with fractions that do not have fractional characters, such as $\frac{3}{8}$. Write out all fractions with full numbers and a virgule (/).

Use a zero in front of the decimal for figures less than one, for example “0.13”.

Do not allow the number of a Section, such as “01 11 00” to be broken at the end of line. To prevent this substitute the spaces between digits with a “no-break space”.

4.6 SYMBOLS

Do not use symbols such as ', ", %, &, °, and # in specifications. Their use causes errors that may not be caught in proofreading. Write out “feet”, “inches”, “percent”, “and”, “degrees”, and “pounds”. Such symbols as “%” and “°” may be used in tables with caution. Note, use the degree symbol from the symbols menu in lieu of a superscript zero.

For the word number, do not use the symbol “#”. Either spell out the word number or use the abbreviation “No.” An ampersand may be used only where it appears in the name or corporate identification of a firm or agency, such as “Pacific Gas & Electric Company (PG&E)”.

Do not use a hyphen for “minus”, “to”, or “through” in data where it is also used as a spacing or separating device or where any question as to the exact meaning may arise. The words “plus or minus” are preferable to using symbols.

4.7 EMPHASIS

Do not use capital letters, quotation marks, bold font, or underlining in the body of the specifications to express emphasis.

4.8 CROSS-REFERENCING

References to the Construction Specifications: In the Construction Specifications, refer to another section, as “Construction Specifications Section 32 11 00, Base Courses”, in lieu of “Standard Specifications Section 32 11 00” or “Section 32 11 00”.

When making a cross-reference to a provision within the Construction Specifications, preferably refer only to the Section, if no ambiguity would be introduced by referring to the entire Section. Make such cross-reference as follows: “as specified in this Section” for provision in the same Section or “as specified in Construction Specifications Section 03 05 15, Portland Cement Concrete”.

If it is necessary to make a reference to a particular Article (and not simply to a Section), write “as specified in Article entitled “Mix Designs” herein” for an Article in the same Section or “as specified in Construction Specifications Section 03 05 15, Portland Cement Concrete, under the Article entitled “Mix Designs””. This avoids confusion which may occur if an Article is re-numbered within a Section.

If it is necessary to make a reference to a particular Paragraph, refer to the Article by name, followed by the Article and Paragraph numbers and letters. Write for example “as specified in Section 03 05 15, Portland Cement Concrete, under the Article entitled “Mix Designs, Paragraph 2.5A.1.”



5.0 FORMATTING

5.1 FORMATTING

Section Organization: Organize each section in accordance with CSI SectionFormat which establishes the order of topics within a section. (See CSI SECTIONFORMAT in instructions.)⁸ This will help maintain consistency throughout the Construction Specifications. Refer also to the Standard Specifications for examples of SectionFormat.

See examples of the following four types of Construction Specifications Sections. Use the Microsoft Word “template” files whose names are stated below.

- Section invokes the Standard Specifications with no changes: Use Template A (See also Exhibit E)
- Section invokes the Standard Specifications “as modified” in the Construction Specifications Section: Use Template A. (See also Exhibit F)
- Section has a counterpart Standard Specifications Section which is not relevant so the Section supersedes the Standard Specifications Section: Use Template B. (See also Exhibit G)
- There is no Standard Specifications Section; therefore the Construction Specifications Section does not mention the Standard Specifications. Use Template B. (See also Exhibit H)

Templates: Templates A and B are Microsoft Word files with indents, headers, footers, fonts, and standard text to be tailored to the individual contract and section. Template B includes Microsoft styles.

5.2 TABLE FORMATTING

Format tables simply, see example below, Figure D. Format without shading and do not use black background with white letters. Incorporate table header in Paragraph introduction or table header as appropriate.

It is preferable to organize multi-column lists of data in a table instead of using tab keys. Apply “no borders” if desired.

⁸ SectionFormat / PageFormat, Recommended Format for Construction Specifications Sections, Copyright © 2008 by the Construction Specifications Institute.



Figure D – Typical Table Format

Mortar for Unit Masonry				
Type per CBC	Proportioning (Parts by Volume)			Minimum Strength (psi at 28 days)
	Portland Cement	Sand	Hydrated Lime or Lime Putty	
M	1	2-3/4 to 3-3/4	1/4 max.	2500

6.0 SOURCE INFORMATION AND REFERENCES

The following documents are copyrighted by Construction Specifications Institute:

1. Project Resource Manual (CSI Manual of Practice), Fifth Edition, Copyright © 2005.
2. MasterFormat, current edition.
3. SectionFormat / PageFormat, Recommended Format for Construction Specifications Sections, Copyright © 2008.
4. Construction Specifications Practice Guide, Copyright © 2011.



CALIFORNIA HIGH-SPEED TRAIN PROJECT

CONSTRUCTION SPECIFICATIONS

FOR

CONTRACT NAME

CONTRACT NO. _____

20__

**__ SUBMITTAL LEVEL OR READY FOR
CONSTRUCTION**

**CHSTP CONSTRUCTION SPECIFICATIONS PREPARATION MANUAL
EXHIBIT B – CONSTRUCTION SPECIFICATIONS PREFACE**

CALIFORNIA HIGH-SPEED TRAIN PROJECT – CONSTRUCTION SPECIFICATIONS
Contract No. XXX - Contract Name

Construction Specifications

Where indicated, the Construction Specifications invoke, modify, and supplement the California High-Speed Train Project Standard Specifications, Dated _____.

The organization and sequence of Articles and Paragraphs in these Construction Specifications Sections which invoke, modify, and supplement the Standard Specifications are aligned with like identified Articles and Paragraphs contained in the referenced Standard Specifications Sections.

Accordingly, Article(s) in these Construction Specifications which specify modifications shall be understood to mean modifications to the provisions contained in like numbered and titled Articles in the referenced Standard Specifications Sections.

**CHSTP CONSTRUCTION SPECIFICATIONS PREPARATION MANUAL
EXHIBIT C – CONSTRUCTION SPECIFICATIONS SEAL PAGES**

**CALIFORNIA HIGH-SPEED TRAIN PROJECT – CONSTRUCTION SPECIFICATIONS
Contract No. XXX - Contract Name**

The Construction Specifications contained herein have been prepared by or under the direction of the following Registered Persons. In signing and sealing these Construction Specifications the Registered Person acknowledges having reviewed and adopted in regard to the Work the Standard Specifications Section as invoked and modified in the corresponding Construction Specifications Section.

CONSTRUCTION SPECIFICATIONS SECTIONS XX XX XX, XX XX XX, XX XX XX,
XX XX XX, XX XX XX, XXXX XX, XX XX XX, XX XX XX, XX XX XX

ENGINEER'S NAME, PE
REGISTERED CIVIL ENGINEER
FIRM NAME.

(SPACE FOR SEAL)

CONSTRUCTION SPECIFICATIONS SECTIONS XX XX XX, XX XX XX, XX XX XX,
XX XX XX, XX XX XX, XXXX XX, XX XX XX, XX XX XX, XX XX XX (IN REGARD TO
WORK BETWEEN STATION ____ AND STATION ____ ONLY)

ENGINEER'S NAME, PE
REGISTERED CIVIL ENGINEER
FIRM NAME

(SPACE FOR SEAL)

SEALS PAGE

Date: (Issue / Edition Date)
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**CHSTP CONSTRUCTION SPECIFICATIONS PREPARATION MANUAL
EXHIBIT C – CONSTRUCTION SPECIFICATIONS SEAL PAGES**

**CALIFORNIA HIGH-SPEED TRAIN PROJECT – CONSTRUCTION SPECIFICATIONS
Contract No. XXX - Contract Name**

CONSTRUCTION SPECIFICATIONS SECTIONS XX XX XX, XX XX XX, XX XX XX,
XX XX XX, XX XX XX, XXXX XX, XX XX XX, XX XX XX, XX XX XX

ENGINEER'S NAME, PE
REGISTERED STRUCTURAL
ENGINEER
FIRM NAME

(SPACE FOR SEAL)

CONSTRUCTION SPECIFICATIONS SECTIONS XX XX XX, XX XX XX, XX XX XX,
XX XX XX, XX XX XX, XXXX XX, XX XX XX, XX XX XX, XX XX XX

ARCHITECT'S NAME, RA
LICENSED ARCHITECT
FIRM NAME

(SPACE FOR SEAL)

CONSTRUCTION SPECIFICATIONS SECTIONS XX XX XX, XX XX XX, XX XX XX (IN
REGARD TO STREET LIGHTING ONLY)

ENGINEER'S NAME
REGISTERED ELECTRICAL
ENGINEER
FIRM NAME

(SPACE FOR SEAL)

SEALS PAGE

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**CHSTP CONSTRUCTION SPECIFICATIONS PREPARATION MANUAL
EXHIBIT D – CONSTRUCTION SPECIFICATIONS TABLE OF CONTENTS**

**CALIFORNIA HIGH-SPEED TRAIN PROJECT – CONSTRUCTION SPECIFICATIONS
Contract No. XXX - Contract Name**

CONSTRUCTION SPECIFICATIONS TABLE OF CONTENTS

Section No. Title

GENERAL REQUIREMENTS SUBGROUP

Division 01 - General Requirement

01 33 00	Submittal Procedures
01 33 23	Shop Drawings, Product Data and Samples
01 45 00	Quality Control
01 52 00	Construction Facilities
01 74 13	Progress Cleaning
01 78 23	Operation and Maintenance Data

FACILITY CONSTRUCTION SUBGROUP

Division 02 – Technical General Requirements and Existing Conditions

02 01 00	Standard Specifications General Statements
02 01 56.39	Temporary Tree and Plant Protection
02 21 13	Site Surveys
02 21 23	Field Engineering
02 21 33	Photographic Documentation
02 22 00	Existing Conditions Assessment

Division 03 - Concrete

03 05 15	Portland Cement Concrete
03 05 18	Prestressed Concrete
03 11 00	Concrete Forming
03 11 15	Falsework
03 15 33	Concrete Anchor Bolts
03 20 00	Concrete Reinforcing
03 30 00	Cast-In-Place Concrete
03 60 00	Grouting

CONSTRUCTION SPECIFICATIONS TABLE OF CONTENTS

Date: (Issue / Edition Date)

01 01 10 – 1

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**CHSTP CONSTRUCTION SPECIFICATIONS PREPARATION MANUAL
EXHIBIT D – CONSTRUCTION SPECIFICATIONS TABLE OF CONTENTS**

**CALIFORNIA HIGH-SPEED TRAIN PROJECT – CONSTRUCTION SPECIFICATIONS
Contract No. XXX - Contract Name**

Section No. Title

04 22 00 **Division 04 - Masonry**
Concrete Unit Masonry

05 05 22 **Division 05 - Metals**
Metal Welding
05 50 00 Metal Fabrications
05 70 00 Decorative Metal
05 73 00 Decorative Metal Railings

Divisions 06 Through 19 – Not Used

FACILITY SERVICES SUBGROUP

Divisions 20 To 25 – Not Used

26 05 00 **Division 26 - Electrical**
Common Work Results for Electrical
26 05 13 Medium-Voltage Cables
26 05 16 25 kV Feeder Cable
26 05 19 Low-Voltage Electrical Power Conductors and Cables
26 05 26 Grounding and Bonding for Electrical Systems
26 05 29 Hangers, Supports, Seismic Protection, and Sealants
26 05 30 Sleeves, Sealants and Grout
26 05 48 Vibration and Seismic Controls for Facility Power Systems
26 05 53 Identification for Electrical System
26 50 00 Lighting

Divisions 27 to 29 - Not Used

SITE AND INFRASTRUCTURE SUBGROUP

Division 30 - Not Used

CONSTRUCTION SPECIFICATIONS TABLE OF CONTENTS

Date: (Issue / Edition Date)

01 01 10 – 2

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FileName: toc exhibit.docx

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**CHSTP CONSTRUCTION SPECIFICATIONS PREPARATION MANUAL
EXHIBIT D – CONSTRUCTION SPECIFICATIONS TABLE OF CONTENTS**

**CALIFORNIA HIGH-SPEED TRAIN PROJECT – CONSTRUCTION SPECIFICATIONS
Contract No. XXX - Contract Name**

Section No. Title

Division 31 - Earthwork

31 05 00	Common Work Results for Earthwork
31 11 00	Clearing and Grubbing
31 23 19	Dewatering
31 50 00	Excavation Support and Protection

Division 32 - Exterior Improvements

32 11 23	Aggregate Base Courses
32 12 16	Asphalt Paving
32 16 16	Concrete Curbs, Gutters, and Walks
32 17 13	Parking Bumpers
32 17 23	Pavement Markings
32 31 13	Chain Link Fences and Gates

Division 33 - Utilities

33 05 14	Utility Grade Adjustment
33 05 16	Utility Structures
33 05 24	Trenchless Utility Installation
33 05 25	Support and Protection of Utilities
33 05 28	Trenching and Backfilling for Utilities
33 10 00	Water Utilities
33 30 00	Sanitary Sewerage Utilities
33 40 00	Storm Drainage Utilities

Divisions 34 to 39 – Not Used

PROCESS EQUIPMENT SUBGROUP - Not Used

END OF TABLE OF CONTENTS

CONSTRUCTION SPECIFICATIONS TABLE OF CONTENTS

Date: (Issue / Edition Date)

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Phase: (i.e. Initial Draft)

FileName: toc exhibit.docx

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**PRODUCTION GUIDANCE FOR CONSTRUCTION SPECIFICATIONS FOR CHSTP
EXHIBIT E – CONSTRUCTION SPECIFICATIONS SECTION
INVOKING STANDARD SPECIFICATIONS SECTION**

CALIFORNIA HIGH-SPEED TRAIN PROJECT – CONSTRUCTION SPECIFICATIONS
Contract No. XXX - Contract Name

SECTION 31 35 00

SLOPE PROTECTION

The provisions of CHSTP Standard Specifications Section 31 35 00, Slope Protection, shall apply to the Work.

END OF SECTION

Date: (Issue / Edition Date)
FileName: exhibit e.docx

SLOPE PROTECTION
31 35 00 – 1

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**PRODUCTION GUIDANCE FOR CONSTRUCTION SPECIFICATIONS FOR CHSTP
EXHIBIT F – CONSTRUCTION SPECIFICATIONS SECTION
MODIFYING STANDARD SPECIFICATIONS SECTION**

CALIFORNIA HIGH-SPEED TRAIN PROJECT – CONSTRUCTION SPECIFICATIONS
Contract No. XXX - Contract Name

SECTION 31 35 00

SLOPE PROTECTION

The provisions of CHSTP Standard Specifications Section 31 35 00, Slope Protection, shall apply to the Work as modified herein.

PART 1 – GENERAL

1.1 SECTION INCLUDES: Delete Paragraphs 1.1A. through E. and substitute the following:

- A. Hydroseeding.

END OF SECTION

Date: (Issue / Edition Date)
FileName: for exhibit f.docx

SECTION TITLE
XX XX XX – 1

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**PRODUCTION GUIDANCE FOR CONSTRUCTION SPECIFICATIONS FOR CHSTP
EXHIBIT G – CONSTRUCTION SPECIFICATIONS SECTION
SUPERSEDING STANDARD SPECIFICATIONS SECTION**

**CALIFORNIA HIGH-SPEED TRAIN PROJECT – CONSTRUCTION SPECIFICATIONS
Contract No. XXX – Contract Name**

SECTION 31 35 00

SLOPE PROTECTION

The provisions of CHSTP Standard Specifications Section 31 35 00, Slope Protection, shall be superseded by the Construction Specifications herein.

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Artwork stone paving.

1.2 SLOPE PROTECTION CLASSIFICATION

- A. Artwork Stone Paving: Sculptured stone laid as indicated with joints filled with mortar or grout.

1.3 REFERENCE STANDARDS

- A. ASTM International(ASTM):
 - 1. ASTM C33 Standard Specification for Concrete Aggregates
 - 2. ASTM C144 Standard Specification for Aggregate for Masonry Mortar
 - 3. ASTM C150 Standard Specification for Portland Cement
 - 4. ASTM C568 Standard Specification for Limestone Dimension Stone
 - 5. ASTM C615 Standard Specification for Granite Dimension Stone

1.4 SUBMITTALS

- A. Shop Drawings: Submit shop drawings.
- B. Product Data: Submit product data for accessories, if applicable.
- C. Mix Designs: Submit mix designs for mortar or grout, and other accessories.

1.5 SITE CONDITIONS

- A. Do not grout slope or channel paving or place concrete slope paving when the temperature falls below 50 degrees F. During cold weather, provide protective coverings for the work.
- B. Perform no grouting or concrete work when it is forecasted that the temperature will drop below 32 degrees F within four days following its installation. Should any work be exposed to temperature of 40 degrees F or below, within four days after grouting or concrete placement, cover the work with a one-foot thick layer of straw, hay, or mulch; then cover with a weighted cover of canvas or plastic sheet.

SLOPE PROTECTION
31 35 00 – 1

Date: 03/01/2012
FileName: 31 35 00 Slope Protection Exhibit G.docx

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**PRODUCTION GUIDANCE FOR CONSTRUCTION SPECIFICATIONS FOR CHSTP
EXHIBIT H – CONSTRUCTION SPECIFICATIONS SECTION
WITH NO CORRESPONDING STANDARD SPECIFICATIONS SECTION**

**CALIFORNIA HIGH-SPEED TRAIN PROJECT – CONSTRUCTION SPECIFICATIONS
Contract No XXX - Contract Name
NEW**

SECTION 21 41 00

WATER STORAGE TANK DISINFECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Water tank disinfection.
- B. Bacteriological testing

1.2 REFERENCE STANDARDS

- A. American Water Works Association (AWWA):
 - 1. AWWA C652 Disinfection of Water Storage Facilities

1.3 SUBMITTALS

- A. Procedure: Submit procedures description for disinfection.
- B. Field Quality Control Submittals: Submit test reports.

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with AWWA C652.

1.5 QUALITY ASSURANCE

- A. Perform work in accordance with AWWA C652.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Perform work in accordance with AWWA C652.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Disinfection agents: Provide materials conforming to AWWA requirements.
- B. Comply with standards of jurisdictional authorities pertaining to materials.

PART 3 - EXECUTION

3.1 DISINFECTION

- A. Perform disinfection.

WATER STORAGE TANK DISINFECTION

Date: 06/29/2012

21 41 00 – 1

Phase: End of FY 11-12

FileName: 33 13 13 water storage tanks disinfection.docx

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